Intelligent Assistants and the Internet of Things as the Next Marketing Landscape

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INTRODUCTION

For several decades a series of recurrent and distinct paradigm shifts has occurred in the capabilities and applications of Internet technologies. Beginning with the concept of Web 2.0, conceived by DiNucci in 1999 (Aced, 2013), it has become a common and conventional conception that beginning with the World Wide Web's commercial availability in the 1990's, a new iteration in its character and contours emerges approximately every ten years. Accordingly, these defining intervals of the Web's evolution is summarized as:

Web 1.0 (1990-2000) – Read Only … mainly used by companies and personal websites to show their information.

Web 2.0 (2000-2010) – Read and Write Web … also known as the "The Social web" … users were not only able to read the websites but they could also interact and connect with other users. Blogs, Facebook, YouTube all began in Web 2.

Web 3.0 (2010-2020) – The Semantic Web defines organized or structured data to simplify automation, integration and discovery across multiple applications … focuses on the intelligent connection between people and machines … and … with devices using Internet.

Web 4.0 (2020 and 2030) – The Intelligent Web … computers will turn into personal assistants using virtual realities, all house appliances will be connected to the internet … highly intelligent interactions will take place between machines and humans.

Web 5.0 (2030…) – "The Telepathic Web"... highly advanced, complex … brain implants … will give people the power and ability to communicate with the Internet through thoughts. All kinds of payments will be made by using a microchip in the brain or on the hand and all of the devices will be connected to the internet and will be controlled by the humans either through mobile apps or through their thoughts. (Smith, 2018)

With new iterations of the Web, the essential computing platform configuration and user interface used to connect and interact with our ever-expanding digitized world also changed. Over the course of the past three decades portals to the digital world have expanded from desk and laptop pc's, to mobile phones and tablets. Input modalities have gone from moving a mouse, typing keywords, clicking but-

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tons and hyperlinks to tapping apps, pinching pages and swiping screens. Society has lived through the "Google-dominated web-based information retrieval of the 00s, yielded to the Apple-Android mobile duopoly and the warehouse of apps paradigm of the 10's," have entered an era of "intelligent cloud computing" that is increasingly guided by AI infused apps and services and are now moving to the next iteration, Web 4.0, which will be defined by "ambient computing via the Internet of Things" (Ward, 2016). Together with ongoing exponential take-off of the Internet of Things (IoT), the emergence of voice-based virtual assistants as a primary user interface provides the necessary and sufficient condition for the next paradigm shift. Advancing the proposition that platform and user interface (UI) shifts go hand and hand, Kinsella (2019) observes,

voice assistants represent the third key UI and technology platform shift of the past three decades, following the web in the 1990's and smartphones about 10 years ago … The World Wide Web was built on the back of the Internet, and PC proliferation enabled web pages to be easily accessed. Smartphone mobile operating systems such as iOS and Android were important developments, but the app economy also relied on the introduction of cloud computing for efficiently delivering content along with regular feature updates and performance enhancements. Voice computing relies on artificial intelligence for speech recognition and natural language understanding.

Transformation to this new paradigm will be both simple and swift. Indeed, if for no other reason that humans generally speak three times faster than typing (Leonard, 2019), it is a safe bet that "natural language will be the primary interface in the era of ubiquitous and mobile computing … In the past, we had to learn the computer's interface; now we get to interact with the computer using the human interface—natural language" (Lam, 2019). Whereas, consumers needed to learn new coding languages and techniques for interacting with previous technology platforms, "the shift to voice doesn't require any training … users simply "speak" as they do naturally (Kinsella, 2019).

This entry explores the ramifications of this latest technology platform shift. Just as the Web precipitated the emergence of e-commerce and the smartphone enabled the explosion of social media, the advent of a voice-based interface that allows people access to, communication with, and control of most anything in our world—via the IoT. Accordingly, the objectives of this entry are threefold: review the findings of these initial, and other related articles, in the context of their relevance to the changing business/ marketing landscape defined by voice based interface (VBI) to a world connected to an Internet of Intelligent Things (IoIT); understand the technical specifications and broad-based applications of VBI will be delineated along with the ramifications occasioned by the global diffusion of the IoIT; and, explore the ramifications of this new landscape will be examined through analyses of the most prominent examples of digital assistants that are in use or development.

BACKGROUND

Today, people have access to digital assistants that can instantly access and analyze any type of data (structured or unstructured) across multiple databases and answer (in the language of your choosing) any question you propose. There are an ever-expanding variety of digital assistants readily available with a simple salutation, to serve as a personal concierge. In addition to organizing a person's everyday activities and controlling every system in their life (home entertainment, security, utility, appliances), these personal digital assistants can also serve as virtual companions and friends that know every mood,